



# Morpho - agronomic characteristics of a newly released rice variety Dhruba

Goutam Kumar Mallick<sup>\*</sup>, Gunadhar Sardar, Partha Pratim Ghosh, Vivekananda Mandi, Somenath Mukhopadhyay

Rice Research Station, Bankura, West Bengal – 722 101, India

**\*Corresponding author:**

Rice Research Station, Bankura, West Bengal – 722 101, India

Email: mallickgkgene@gmail.com

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**General Note**



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## ABSTRACT

BNKR – 2 (Dhruba), a late duration rice variety developed at Rice Research Station, Bankura, West Bengal, India. It was released by the 'State Variety Release Committee, West Bengal', India in 2014. Morpho – Agronomic Characteristics of BNKR – 2 (Dhruba) are described in this paper in details through DUS test data.

**Key words:** Rice Variety, BNKR – 2 (Dhruba), IET 20761, Late duration, Pedigree selection, Morpho Agronomic characteristics, Bankura, West Bengal.

## INTRODUCTION

Rice is a complicated crop which grown in diverse agro-climatic condition. To utilize its good yield potentiality specific adaptability of rice is most important. So study of agro-morphic characteristics will be very much helpful to the breeder for future crop improvement. Previously Sinha and Mishra<sup>1-4</sup> and Sinha *et. al.*<sup>5</sup> studied agro-morphic characteristics of different land races of rice of red and lateritic areas of West Bengal, India. Scientists of Rice Research Station, Bankura, West Bengal, India developed two rice varieties namely Puspa<sup>6</sup> and Dhiren<sup>7</sup> and studied their morpho-agronomic characteristics<sup>8,9</sup>. CN 1340-76-1-BNKR 23-7-2, a rice culture developed through pedigree selection from a cross between IR 42 (female parent) and Patnai 23 (Male parent) at Rice Research Station, Bankura. It was nominated to Directorate of Rice Research, Hyderabad for AICRIP trial IVT-Late in 2008 from the end of Rice Research Station, Bankura, West Bengal. It completed three years (2008, 2009 and 2010) of National Testing in the name of IET 20761. After three years of testing IET 20761 had been recommended for release in irrigated areas of West Bengal under transplanted condition. Before release as BNKR – 2 (Dhruba) by 'State Variety Release Committee, West Bengal' in 2014, DUS testing of IET 20761 was conducted at Rice Research Station, Bankura, West Bengal during *Kharif* 2009 and 2010, following National Guide lines<sup>10</sup>.

## MATERIALS AND METHODS

Thirty days old seedling of IET 20761 were transplanted in the well prepared puddled field of Rice Research Station, Bankura during *Kharif* 2009 and 2010. N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O applied at the dose of 60 : 30 : 30 kg ha<sup>-1</sup>. Full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O applied as basal. Half dose of N applied as basal, one forth dose of N applied during tillering and rest one forth dose applied during panicle initiation stage. Field test carried out under conditions ensuring normal growth of plant. Row to row distance 30 cm and plant to plant distance 20 cm, row length 10 m, number of rows 50, five replications were maintained as per requirements of DUS test. Assessment of each characteristics were made as indicated by guide lines of DUS test of rice. Phenol reaction of lemma was tested following the Methods of Chang and Bardenas<sup>11</sup>.

## RESULTS AND DISCUSSION

DUS test characteristics of rice variety BNKR – 2 (Dhruba) (IET 20761) are presented in Table – 1. From this, it is evident that 'BNKR – 2 (Dhruba)' is a late maturing semi dwarf, erect rice variety with medium thick stem and medium tillering ability. It has no anthocyanin colouration on its nodes and internodes. It has medium green colour, medium broad and medium long leaf with late leaf senescence. It has no anthocyanin colouration on leaf, leaf sheath and auricle with light purple colour. It has light purple split ligule. It has weak pubescence on leaf blade. It's flag leaf is erect in early observation and in late observation. Spikelet: Colour of stigma is white and colour of tip of lemma is yellowish and density of pubescence on lemma is medium. Hull colour is stained in Phenol reaction. It has medium, fully exerted, semi-straight type panicle with strong secondary branching. Attitude of branches on panicle axis is erect to semi-erect. It has short bold gold coloured awnless grains. It's decorticated grain is white in colour and aroma less and endosperm contains medium ranges of amylose. It is to be noted that the rice variety Dhruba released by State Variety Released Committee, West Bengal in 2011 and was notified by Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops Ministry of Agriculture and Farmers' Welfare, Govt. of India (Notification No. S.O. 1007 (E) dt.30/03/2017).

**Table 1** Morpho-agronomic characteristics of BNKR – 2 (Dhruba) (IET 20761)

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
1.	Coleoptile: Colour	Colourless Green* Purple	1 2* 3	Colourless Green* Purple	1 2* 3	10	VS
2.	Basal Leaf: Sheath Colour	Green* Light Purple Purple Lines Purple	1* 2 3 4	Green* Light Purple Purple Lines Purple	1* 2 3 4	40	VS
3.	Leaf: Intensity of green colour	Light Medium*	3 5*	Light Medium*	3 5*	40	VG

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
		Dark	7	Dark	7		
4.	Leaf: Anthocyanin Colouration	Absent* Present	* 9	Absent* Present	1* 9	40	VG
5.	Leaf: Distribution of anthocyanin colouration	On tips only On margins only In blotches only Uniform	1 2 3 4	On tips only On margins only In blotches only Uniform	1 2 3 4	40	VG
6.	Leaf sheath: Anthocyanin colouration	Absent* Present	1* 9	Absent* Present	1* 9	40	VG
7.	Leaf sheath: Intensity of anthocyanin colouration	Very weak Weak Medium Strong Very strong	1 3 5 7 9	Very weak Weak Medium Strong Very strong	1 3 5 7 9	40	VG
8.	Leaf : Pubescence of blade surfaces	Absent Weak* Medium Strong Very strong	1 3* 5 7 9	Absent Weak* Medium Strong Very strong	1 3* 5 7 9	40	VS
9.	Leaf: Auricles	Absent Present*	1 9*	Absent Present*	1 9*	40	VS
10.	Leaf: Anthocyanin colouration of auricles	Colourless Light purple* Purple	1 2* 3	Colourless Light purple* Purple	1 2* 3	40	VS
11.	Leaf: Collar	Absent* Present	1* 9	Absent* Present	1* 9	40	VS
12.	Leaf: Anthocyanin colouration of collar	Absent Present	1 9	Absent Present	1 9	40	VS
13.	Leaf: Ligule	Absent Present*	1 9*	Absent Present*	1 9*	40	VS
14.	Leaf: Shape of ligule	Truncate Acute Split*	1 2 3*	Truncate Acute Split*	1 2 3*	40	VS
15.	Leaf: Colour of ligule	Green Light purple* Purple	1 2* 3	Green Light purple* Purple	1 2* 3	40	VS
16.	Leaf: Length of blade	Short Medium* Long	3 5* 7	Short Medium* Long	3 5* 7	40	MS
17.	Leaf: Width of blade	Narrow Medium * Broad	3 5* 7	Narrow Medium * Broad	3 5* 7	40	VS
18.	Culm: Attitude(for floating rice only)	Non procumbent Procumbent	1 9	Non procumbent Procumbent	1 9	40	VS
19.	Culm: Attitude	Erect* Semi-erect Open Spreading	1* 3 5 7	Erect* Semi-erect Open Spreading	1* 3 5 7	40	VS
20.	Time of heading(50% of plant with panicles)	Very early(< 71 days) Early( 71-90 days) Medium(91-110 days) Late(111-130 days)*	1 3 5 7*	Very early(< 71 days) Early( 71-90 days) Medium(91-110 days) Late(111-130 days)*	1 3 5 7*	55	VG

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
		Very late(> 130 days)	9	Very late(> 130 days)	9		
21.	Flag leaf: Attitude of blade(early observation)	Erect*	1*	Erect*	1*	60	VG
		Semi-erect	3	Semi-erect	3		
		Horizontal	5	Horizontal	5		
		Deflexed	7	Deflexed	7		
22.	Spikelet: Density of Pubescence of lemma	Absent	1	Absent	1	60-80	VS
		Weak	3	Weak	3		
		Medium*	5*	Medium*	5*		
		Strong	7	Strong	7		
		Very strong	9	Very strong	9		
23.	Male sterility	Absent*	1	Absent*	1	65	VG
		Present	9	Present	9		
24.	Lemma: Anthocyanin colouration of keel	Absent or very weak*	1*	Absent or very weak*	1*	65	VS
		Weak	3	Weak	3		
		Medium	5	Medium	5		
		Strong	7	Strong	7		
		Very strong	9	Very strong	9		
25.	Lemma: Anthocyanin colouration of area below apex.	Absent*	1*	Absent*	1*	65	VS
		Weak	3	Weak	3		
		Medium	5	Medium	5		
		Strong	7	Strong	7		
		Very strong	9	Very strong	9		
26.	Lemma: Anthocyanin colouration of apex	Absent*	1*	Absent*	1*	65	VS
		Weak	3	Weak	3		
		Medium	5	Medium	5		
		Strong	7	Strong	7		
		Very strong	9	Very strong	9		
27.	Spikelet: Colour of stigma	White*	1*	White*	1*	65	VS
		Light green	2	Light green	2		
		Yellow	3	Yellow	3		
		Light purple	4	Light purple	4		
		Purple	5	Purple	5		
28.	Stem: Thickness	Thin	3	Thin	3	70	VS
		Medium*	5*	Medium*	5*		
		Thick	7	Thick	7		
29.	Stem: Length(excluding panicle: excluding floating rice)	Very short (<91cm)	1	Very short (<91cm)	1	70	VS
		Short (91-110cm)*	3*	Short (91-110cm)*	3*		
		Medium (111-130cm)	5	Medium (111-130cm)	5		
		Long (131-150cm)	7	Long (131-150cm)	7		
		Very long (> 150cm)	9	Very long (> 150cm)	9		
30.	Stem: Anthocyanin colouration of nodes	Absent*	1*	Absent*	1*	70	VS
		Present	9	Present	9		
31.	Stem: Intensity of anthocyanin colouration of nodes	Absent*	1*	Absent*	1*	70	VS
		Weak	3	Weak	3		
		Medium	5	Medium	5		
		Strong	7	Strong	7		
32.	Stem: Anthocyanin colouration of internodes	Absent*	1*	Absent*	1*	70	VS
		Present	9	Present	9		
33.	Panicle: Length of main axis	Very short (< 16cm)	1	Very short (< 16cm)	1	70-90	MS
		Short (16-20cm)	3	Short (16-20cm)	3		
		Medium (21-25cm)*	5*	Medium (21-25cm)*	5*		
		Long (26-30cm)	7	Long (26-30cm)	7		
		Very long (> 30cm)	9	Very long (> 30cm)	9		

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
34.	Flag leaf: Attitude of blade (late observation)	Erect*	1*	Erect*	1*	90	VG
		Semi-erect	3	Semi-erect	3		
		Horizontal	5	Horizontal	5		
		Deflexed	7	Deflexed	7		
35.	Panicle: Curvature of main axis	Strong	1	Strong	1	90	VG
		Semi-straight*	3*	Semi-straight*	3*		
		Drooping	5	Drooping	5		
		Deflexed	7	Deflexed	7		
36.	Panicle: Number per plant	Few (<11)	3	Few (<11)	3	80-90	MS
		Medium (11-21)*	5*	Medium (11-21)*	5*		
		Many (>20)	7	Many (>20)	7		
37.	Spikelet: Colour of tip of lemma	White	1	White	1	80-90	VS
		Yellowish*	2*	Yellowish*	2*		
		Brown	3	Brown	3		
		Red	4	Red	4		
		Purple	5	Purple	5		
38.	Lemma and palea: Colour	Black	6	Black	6	90	VG
		Straw	1	Straw	1		
		Gold and gold furrows* on straw background	2*	Gold and gold furrows* on straw background	2*		
		Brown spots on straw	3	Brown spots on straw	3		
		Brown furrows on straw	4	Brown furrows on straw	4		
		Brown (tawny)	5	Brown (tawny)	5		
		Reddish to light purple	6	Reddish to light purple	6		
		Purple spots on straw	7	Purple spots on straw	7		
		Purple furrows on straw	8	Purple furrows on straw	8		
		Purple	9	Purple	9		
39.	Panicle: Awns	Absent*	1*	Absent*	1*	90	VG
		Present	9	Present	9		
40.	Panicle: Colour of awns (Late observation)	Yellowish white	1	Yellowish white	1	90	VS
		Yellowish brown	2	Yellowish brown	2		
		Brown	3	Brown	3		
		Reddish brown	4	Reddish brown	4		
		Light red	5	Light red	5		
		Red	6	Red	6		
		Light purple	7	Light purple	7		
		Purple	8	Purple	8		
		Black	9	Black	9		
41.	Panicle: Length of longest awn	Very short	1	Very short	1	90	VS
		Short	3	Short	3		
		Medium	5	Medium	5		
		Long	7	Long	7		
		Very long	9	Very long	9		
42.	Panicle: Distribution of awns	Tips only	1	Tips only	1	90	VS
		Upper half only	3	Upper half only	3		
		Whole length	5	Whole length	5		
43.	Panicle: Presence of secondary branching	Absent	1	Absent	1	90	VG
		Present*	9*	Present*	9*		
44.	Panicle: Secondary branching	Weak	1	Weak	1	90	VG
		Strong*	2*	Strong*	2*		
		Clustered	3	Clustered	3		
45.	Panicle: Attitude of branches	Erect	1	Erect	1	90	VG
		Erect to semi-erect*	3*	Erect to semi-erect*	3*		

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
		Semi erect	5	Semi erect	5		
		Semi erect to spreading	7	Semi erect to spreading	7		
		Spreading	9	Spreading	9		
46.	Panicle: Exsertion	Partly exerted	3	Partly exerted	3	90	VG
		Exserted	5	Exserted	5		
		Well exerted *	7*	Well exerted *	7*		
47.	Time of Maturity:	Very early	1	Very early	1	90	VG
		Early	3	Early	3		
		Medium	5	Medium	5		
		Late*	7*	Late*	7*		
		Very late	9	Very late	9		
48.	Leaf: Sencence	Early	3	Early	3	92	VG
		Medium	5	Medium	5		
		Late*	7*	Late*	7*		
49.	Sterile lemma: Colour	Straw	1	Straw	1	92	VS
		Gold *	2*	Gold *	2*		
		Red	3	Red	3		
		Purple	4	Purple	4		
50.	Grain: Weight of 1000 fully developed grains(gm)	Very low	1	Very low	1	92	VS
		Low	3	Low	3		
		Medium*	5*	Medium*	5*		
		High	7	High	7		
		Very high	9	Very high	9		
51.	Grain : Length	Very short	1	Very short	1	92	MS
		Short*	3*	Short*	3*		
		Medium	5	Medium	5		
		Long	7	Long	7		
		Very long	9	Very long	9		
52.	Grain: Width	Very narrow	1	Very narrow	1	92	MS
		Narrow	3	Narrow	3		
		Medium*	5*	Medium*	5*		
		Broad	7	Broad	7		
		Very broad	9	Very broad	9		
53.	Grain: Phenol reaction of lemma	Absent	1	Absent	1	92	VG
		Present*	9*	Present*	9*		
54.	Decorticated grain: Length	Very short	1	Very short	1	92	MS
		Short*	3*	Short*	3*		
		Medium	5	Medium	5		
		Long	7	Long	7		
		Very long	9	Very long	9		
55.	Decorticated grain: Width	Narrow (<2.0mm)	3	Narrow (<2.0mm)	3	92	MS
		Medium (2.0-2.5mm)*	5*	Medium (2.0-2.5mm)*	5*		
		Broad (>2.5mm)	7	Broad (>2.5mm)	7		
56.	Decorticated grain: Shape (in lateral view)	Short slender	1	Short slender	1	92	MS
		Short bold *	2*	Short bold *	2*		
		Medium slender	3	Medium slender	3		
		Long slender	4	Long slender	4		
		Long bold	5	Long bold	5		
		Extra long slender	6	Extra long slender	6		
57.	Decorticated grain: Colour	White*	1*	White*	1*	92	VG
		Light brown	2	Light brown	2		
		Variegated brown	3	Variegated brown	3		
		Dark brown	4	Dark brown	4		
		Light red	5	Light red	5		

Sl. No.	Characteristics	2009		2010		Stage of observation	Type of assessment
		States	Note	States	Note		
		Red	6	Red	6		
		Variegated purple	7	Variegated purple	7		
		Purple	8	Purple	8		
		Dark purple	9	Dark purple	9		
58.	Endosperm: Presence of amylose	Absent Present*	1 9*	Absent Present*	1 9*	92	MG
59.	Endosperm: Content of amylose	Very low ( <10 % ) Low (10-19 % ) Medium ( 20-25 % )* High ( 26-30 % ) Very high ( > 30 % )	1 3 5* 7 9	Very low ( <10 % ) Low (10-19 % ) Medium ( 20-25 % )* High ( 26-30 % ) Very high ( > 30 % )	1 3 5* 7 9	92	MG
60.	Varieties with endosperm of amylose absent only Polished grain: Expression of white core	Absent or very small Small Medium Large	1 3 5 7	Absent or very small Small Medium Large	1 3 5 7	90	MG
61.	Gelatinization temperature through alkali Spreading value	Low Medium* Medium high High	1 3* 5 7	Low Medium* Medium high High	1 3* 5 7	92	MG
62.	Decorticated grain: Aroma	Absent* Present	1* 9	Absent* Present	1* 9	92	MG

**Note:**

\* = Observed Character

10 = First leaf through coleoptile/second leaf visible (less than 1 cm)

92 = Caryopsis hard (can no longer be by thumbnail and over 90% of spikelets ripened)

40 = Booting (Early boot stage)

50 = First spikelet of inflorescence just visible

MG = Measurement by a single observation of a group of plants or parts of plants

55 = Half of inflorescence emerged

60 = Beginning of anthesis

MS = Measurement of a number of individuals plant or parts of plants

65 = Anthesis half way

70 = Milk development

VG: Visual assessment by a single observation of a group of plants or parts of plants

80 = Dough development

90 = Ripening (Terminal spikelets ripen)

VS = Visual assessment by observation of individual plants or parts of plant

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**Conflict of Interest:**

The authors declare that there are no conflicts of interests.

**Peer-review:**

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**Data and materials availability:**

All data associated with this study are present in the paper.

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